

## CLAIMS

What is claimed:

- 1 1. A virtual storage system for mapping virtual storage segments of  
2 differing sizes to storage locations, comprising:  
3 an agent coupled to the host, the agent having volatile memory for  
4 storing a first table, the table having entries to map the virtual storage  
5 segments to the storage locations; and  
6 a controller coupled to the agent, the controller having non-volatile  
7 memory for storing a second table, the controller intermittently causing  
8 contents of the first table to be replaced by contents of the second table,  
9 whereby during an input/output (I/O) operation, the host accesses  
10 one of the entries in the first table to determine one of the storage  
11 locations.
- 1 2. The system of claim 1, wherein the second table identifies an  
2 alternate storage location within the storage locations.
- 1 3. The system of claim 2, wherein the second table further includes a  
2 bitmap that having entries that correspond to blocks of data stored within  
3 the alternate storage location.
- 1 4. The system of claim 1, further comprising an alternate storage  
2 container comprising alternate storage locations of the storage location  
3 correlating to the virtual storage segments.
- 1 5. The system of claim 4, wherein an I/O operation accesses  
2 information on both the storage location and the alternative storage  
3 location.
- 1 6. The system of claim 5 wherein a bitmap designates blocks at the  
2 alternative storage location to use for the I/O operation.

7. A system for mapping a virtual disk segment to a storage location within a storage device, such that a host queries said system to determine said storage location for input/output operations, said system comprising:

- a first table having a first table entry mapping the virtual disk segment to the storage location;
- a second table having a second table entry corresponding to said storage location and to an alternate storage location, and block bitmap information identifying blocks of data having differing sizes within the alternate storage location;
- a plurality of variables indicating states of the entry;
- an offset for the entry, wherein the offset includes a logic unit number identifier and a block identifier;
- a first memory to store the first table and
- a second memory to store the second table.

1     8.     The system of claim 7, wherein said first memory is a volatile  
2     memory.

1     9.     The system of claim 7, wherein said second memory is a non-volatile  
2     memory.

1    10.    The system of claim 7, wherein the states include a no-write state.

1 11. The system of claim 7, wherein the states include an error state.

1     12.     A method for performing an input/output operation on a virtual  
2     storage segment defined by a first table that maps the storage segment to  
3     a first storage location, the method comprising:  
4             turning off input/output operations at the first storage location;  
5             identifying portions of the virtual storage segment to be effected  
6     during the write operation;

7 storing a record of the identified portions at a second table and not  
8 at the first table; and  
9 writing to a second storage location, whereby the writing operation  
10 occurs at portions of the second storage location associated with the  
11 identified portions.

1 13. The method of claim 12, wherein the turning off step includes  
2 activating an invalid state.

1 14. The method of claim 12, wherein a subsequent read operation for  
2 the virtual segment occur at portions of the first storage location not  
3 included in the identified portions and the portions of the second storage  
4 location associated with the identified portions. .

1 15. The method of claim 14, wherein the first table is stored by an agent  
2 and during the read operation, the record of the identified portions is sent  
3 to the agent.

1 16. The method of claim 15, wherein the mapping between the virtual  
2 storage segment and first storage location is contained in numerous first  
3 tables, each of the first table stored by a different agent.